IN THE CLAIMS

The text of all pending claims, along with their current status, is set forth below in accordance with 37 C.F.R. § 1.121.

1. (*Currently amended*) A computer system for simulating a physical system comprising memory having ~~means, storage means, and~~ object-oriented software in a main simulation system~~, said computer system further comprising~~, the object-oriented software configured to:

   a) provide a logic interface that enables a simulator user of the computer system to dynamically construct logic to customize simulation of transport phenomena through a model of the physical system;

   b) ~~means for converting~~ convert the constructed logic into corresponding object-oriented code during a simulation without intervention of the simulator user;

   c) ~~means for integrating~~ integrate the object-oriented ~~object oriented~~ code with the main simulation system which comprises a simulation data model and simulation algorithms, resulting in an integrated ~~customized~~ simulation system without intervention of the simulator user; and

   d) ~~means for executing~~ execute the integrated simulation system.

2. (*Currently amended*) The computer system of claim 1 wherein the constructed logic comprises facility management logic which is representative of steps used to simulate the ~~for~~ monitoring and controlling of mechanical facilities associated with the physical system.

3. (*Original*) The computer system of claim 1 wherein the logic interface comprises a logic flow chart interface.

4. (*Previously presented*) The computer system of claim 3 wherein the logic flow chart interface comprises one or more of icons, arrows, menus, dialogs, toolbar buttons, and text to enable the simulator user of the computer system to build-up, edit and visualize facility management logic in the form of a flow chart.

5. (*Original*) The computer system of claim 3 wherein the logic flow chart interface comprises icons representing basic logic control constructs for looping, decision making, statement execution, and logic entry and exit.

6. (*Previously presented*) The computer system of claim 5 wherein icons that represent logic control mechanisms enable the simulator user of the computer system to construct customized logic flow charts.

7. (*Original*) The computer system of claim 1 wherein the logic interface comprises a text-based logic code interface.

8. (*Original*) The computer system of claim 7 wherein the text-based logic code interface comprises a graphical text editor for performing one or more of entering, modifying and deleting lines of alpha-numeric text.

9. (*Currently amended*) The computer system of claim 7 wherein the text-based logic code~~, which~~ is a facility management control language~~, is capable of being~~ automatically created from a logic flow chart.

10. (*Currently amended*) The computer system of claim 9 wherein the facility management control language is ~~capable of being~~ automatically ~~convertible~~ converted into object-oriented ~~object oriented~~ facility management code in the form of C++.

11. (*Previously presented*) The computer system of claim 9 wherein the facility management control language is an object-oriented language with features and scope suited to embody facility management logic.

12. (*Currently amended*) The computer system of claim 1 wherein the object-oriented ~~object oriented~~ code is facility management object-oriented code in the form of C++.

13. (*Previously presented*) The computer system of claim 1 wherein the logic interface enables the simulator user of the computer system to develop logic using either a logic flow chart interface or a text-based logic code interface.

14. (*Currently amended*) The computer system of claim 1 wherein the object-oriented code extends ~~has the capability of extending~~ the simulation data model by creating new classes that inherit from the simulation data model, thereby enabling the object-oriented code to call functions of the integrated simulation system ~~simulation data model~~ and use member data of the integrated simulation system ~~simulation data model~~.

15. (*Currently amended*) The computer system of claim 1 wherein the object-oriented software is further configured to ~~further comprises means for compiling~~ compile the object-oriented code into object-oriented facility management object code and ~~means for linking~~ link the object-oriented facility management object code to produce shared libraries, thereby enabling loading of the shared libraries into the main simulation system.

16. (*Currently amended*) The computer system of claim 1 wherein the object-oriented software is further configured to compile ~~further comprises means for compiling~~ the object-oriented code into object-oriented facility management object code and ~~means for linking~~ link the object-oriented facility management object code to produce dynamic linked libraries, thereby enabling linking ~~loading~~ of the dynamic linked libraries into the main simulation system.

17. (*Currently amended*) The computer system of claim 1 wherein the object-oriented software is configured to execute ~~being capable of executing~~ the integrated simulation system by invoking the object-oriented ~~object oriented~~ facility management code at a plurality of timesteps during the simulation.

18. (*Currently amended*) The computer system of claim 17 wherein the object-oriented ~~object oriented~~ facility management code returns ~~is capable of returning~~ control back to the main simulation system after the facility management code has finished executing for a current timestep.

19. (*Original*) The computer system of claim 1 comprises a plurality of connected processors to perform the simulation.

20. (*Currently amended*) A computer-implemented method of simulating a physical system ~~in a computer system comprising memory means, storage means, and object-oriented software in a main simulation system, the method~~ comprising the steps of:

    a) dynamically constructing logic to customize simulation of transport phenomena through a model of the physical system by a reservoir simulator user;

    b) initiating simulation of transport phenomena through the model of the physical system by the reservoir simulator user causing initiation of the following steps without intervention of the reservoir simulator user:

        i) automatically converting the logic into corresponding object-oriented code;

        ii) integrating the object-oriented ~~object oriented~~ code with the main simulation system which comprises a simulation data model and simulation algorithms, resulting in an integrated simulation system for simulating the physical system; and

        iii) executing the integrated simulation system to simulate the physical system.

21. (*Original*) The method of claim 20 wherein the physical system comprises a hydrocarbon-bearing subterranean formation.

22. (*Original*) The method of claim 21 wherein the physical system comprises fluid-containing facilities associated with production of hydrocarbons from the hydrocarbon-bearing subterranean formation.

23. (*Original*) The method of claim 20 wherein construction of the logic comprises using a graphical user interface to perform at least one step chosen from:

    a) selecting and using an existing logic;

    b) selecting and modifying existing logic; and

c) developing new logic.

24. (*Original*) The method of claim 23 wherein construction of the logic produces a logic flow chart.

25. (*Original*) The method of claim 23 wherein construction of the logic produces a text-based logic code.

26. (*Previously presented*) The method of claim 24 wherein construction of the logic flow chart comprises using one or more of icons, arrows, menus, dialogs, toolbar buttons, and text to enable the reservoir simulator user of the computer system to build-up, edit and visualize facility management logic in the form of a flow chart.

27. (*Original*) The method of claim 25 wherein the construction of the logic flow chart comprises using text-based logic code interface comprising a graphical text editor useful for entering, modifying and deleting lines of alpha-numeric text.

28. (*Original*) The method of claim 20 wherein the conversion of the logic is to C++ code.

29. (*Currently amended*) The method of claim 20 wherein the converted object-oriented code extends ~~has the capability of extending~~ the simulation data model by creating new classes that inherit from the simulation data model, thereby enabling the object-oriented code to call functions of the integrated simulation system ~~simulation data model~~ and use member data of the integrated simulation system ~~simulation data model~~.

30. (*Original*) The method of claim 20 wherein execution of the initiated simulation system generates results for predicting the overall behavior of the physical system.

31. (*Original*) The method of claim 20 wherein execution of the initiated simulation system is carried out using a plurality of connected processors.

32-34. (*Cancelled*)

35. (New) A computer system for simulating fluid flow comprising a computer-readable medium encoded with instructions, wherein the instructions are configured to:

construct a reservoir simulation model having a reservoir and facilities, wherein the facilities represent physical equipment in the flow path between a reservoir and a delivery location;

construct model-specific logic that dynamically simulates control of facilities during a simulation run;

convert the constructed model-specific logic into corresponding custom object-oriented code without intervention of a simulator user;

integrate the custom object-oriented code with a main simulation system into an integrated simulation system in a seamless manner;

execute the integrated simulation system; and

display the results of the integrated simulation system.

36. (New) The computer system of claim 35 further comprising a logic flow chart interface having one or more of icons, arrows, menus, dialogs, toolbar buttons, and text and utilized to build-up, edit and visualize facility management logic in the form of a flow chart.

37. (New) The computer system of claim 36 wherein the logic flow chart interface comprises icon types representing basic logic control constructs for looping, decision making, statement execution, and logic entry and exit.

38. (New) The computer system of claim 35 further comprising a text-based logic code interface having a graphical text editor for performing one or more of entering, modifying and deleting lines of alpha-numeric text.

39. (New) The computer system of claim 35 further comprising a logic interface that develops logic using either a logic flow chart interface or a text-based logic code interface.

40. (New) The computer system of claim 35 wherein the physical equipment being modeled comprise one or more of manifolds, pumps, compressors, separators and pipelines.

41. (New) The computer system of claim 35 wherein the results comprise modeling of transport phenomena through the reservoir and facilities of the reservoir simulation model.

42. (New) The computer system of claim 35 wherein the model-specific logic extends functionality of the main simulation system at run-time by creating classes that inherit from a simulation data model of the main simulation system, thereby enabling the application to call functions of the simulation data model and utilize member data of the simulation data model.